Patent Claims

1. Device for locally resolved object distance measurement
with
a frequency shifted feedback emission source for object irradiation with irradiation that can be used for distance measurement and
a position-sensitive object detection sensor,
characterized by the fact that
the frequency shifted feedback emission source for object irradiation is configured with a means for increasing emission frequency component beat intensity and the position-sensitive object detection sensor for detection of beat intensity from the object and incoming irradiation not from the object.

2. Device as described in the preceding claim, characterized by the fact that the means for increasing emission frequency component beat intensity is configured as a means for non-stochastic increase of emission frequency component beat intensity
and/or
includes an injection light source, in particular an injection laser, whereby it is particularly preferred that the light is injected into a resonator that constitutes that frequency shifted feedback emission source, whereby it is especially preferred that incoming irradiation on the amplification medium occurs in the same and whereby it is preferred that the injection light source for emission or irradiation is configured close to the upper or lower amplification threshold (G=1) and/or the injection light source for incoming irradiation from

injection light related to the amplification bandwidth of the frequency shifted feedback emission source is narrowband, in particular a width under 5%, preferably below 1% of the bandwidth of the amplification of the frequency shifted feedback emission source and/or

the injection light source is configured for incoming irradiation of relevant intensity and/or phase of the light modulated by the optical carrier,

in particular for regular modulation of intensity and/or phase of the injection light and/or is configured for the purpose of performing fluctuating, preferably periodic modulation of intensity and/or phase with the time, in particular the inject light source is configured in such a way that at least temporally a linear modulation frequency variation occurs, whereby it is preferred that the injection light source is configured for that purpose, a modulation that is obtained whose frequency lies in the magnitude order and/or close to the distance determined using the emission source and the given chirp rate from the frequency shifted feedback emission source, whereby it is preferred that the frequency shifted feedback emission light source is a laser and an internal optic fiber in the resonator is used as an amplification medium.

3. Device as described in one of the preceding claims, whereby the frequency shifted feedback emission source is a laser and the means for increasing emission frequency component beat intensity is a frequency modulated seed laser irradiating a seed light into the first laser, whereby a means is used

to adapt the frequency of the seed laser frequency modulation to specific distances.

4. Device according to the preceding claim, characterized by the fact that there is a means to change the seed frequency gradually, preferably in steps,

whereby it is preferred that the means is configured to keep the seed frequency constant for a specific measurement time T and/or wobble around a mean value of a respective seed frequency value, in particular around a frequency deviation sufficient for avoiding distance gaps and/or to vary the seed frequency modification upon repeated passes, in particular through systematic frequency resolution decreases in repeated passes.

5. Device according to the preceding claim, characterized by the fact that a filter is used for filtering the beat intensity related objection detection sensor signals detected at the object detection sensor.

6. Device according to the preceding claim, characterized by the fact that the filtering of the filtered alternating signal portions including to that are configured around the seed frequency and/or narrowband.

7. Device according to one of the preceding claims, wherein there is a signal amplification for conditioning the object detection sensor signals amplification step behind the filtering step, with a configuration according to one of the two preceding claims using an amplification stage behind the filter stage,

whereby in particular at least one control loop and/or circuit is used to set a specific signal condition, in particular a specific amplification.

8. Device according to one of the preceding claims, characterized by the fact that a stage for determining the distance using the object detection sensor signal signature is used depending on the seed frequencies.

9. Device according to one of the preceding claims, characterized by the fact that the stage for determining distance using the object detection sensor signal depending on the seed frequencies
is configured
for distance measurement
for purposes of achieving a maximum value of the object detection sensor signal with seed frequency modification prepared as necessary and/or
for purposes of an effective value, in particular a real effective value, in particular as received through rectification or deep pass filtering, of the object detection sensor signal with seed frequency modification prepared as necessary and/or
for purposes of an effective value, in particular in a frequency window around the seed frequency and/or
for purposes of the strength of a seed frequency component in the object detection sensor signal.

10. Device according to one of the preceding claims, characterized by the fact that a stage for modifying the seed frequency along with the time is used and an object detection sensor signal evaluation stage as a distance-related measurement value determines a value representative of a time for achieving a preset object signal signature,

in particular through measurement of the time it takes to achieve a threshold and/or maximum value,

for which in particular an analog maximum hold circuit for detecting the temporal signal course with an allocated digital register for recording a value, in particular a seed frequency related value, in particular a sweep time and/or counter value,

further preferred in particular with a circuit for establishing the value to be recorded dependent on achieving an analog threshold and/or maximum value

is used and/or

for which a directing stage for directing the frequency-dependent object detection sensor signal signature is used, in particular during simultaneous, noise-reducing observation of a signal comparator output.

11. Device according to one of the claims above, characterized by the fact that the position-sensitive object detection sensor is configured for simultaneous and/or temporally close

consecutive sequential receiving and/or evaluation of irradiation from receiving the reflected irradiation from the object on the one hand, and other light from the object on the other hand,

whereby in particular the frequency shifted feedback emission source is configured to emit in infrared

and/or the position-sensitive object detection sensor is configured to further be used to receive visible light as different light from the object, whereby an evaluation of the object detection sensor signal for the received reflected irradiation and other light after various signal conditioning can occur.

12. Device according to one of the preceding claims, characterized by the fact that the position-sensitive object detection sensor is configured for pixel-by-pixel detection of irradiation from the received reflection of the object irradiation and/or other light from the object,

whereby the position-sensitive object detection sensor includes a multi-pixel chip for a multi-color detection with a color filter model and/or uses separate multi-pixel elements for light and /or irradiation in different wavelength ranges that are illuminated via a beam splitter in the object imaging beam path, whereby an image correction stage is used to guide image matching.

13. Device according to one of the preceding claims, characterized by the fact that the position-sensitive object

detection sensor is configured for pixel-by-pixel detection of irradiation from receiving irradiation reflected back from the object and/or light from the object uses a number of evaluation units, specifically per pixel, to increase the evaluation and/or image repetition frequency.

14. Process for locally resolved object distance measurement with
a frequency shifted feedback emission source for object irradiation with irradiation that can be used to measure distance and
a position-sensitive object detection sensor,
characterized by the fact that
the emission frequency component beat intensity increases at the frequency shifted feedback emission source for object irradiation via the received mass coming out through stochastic fluctuation of the frequency shifted feedback emission source and the beat intensity from incoming irradiation both from the object and not from the object is determined as a distance-indicating signal.